

What is claimed is:

1. A gearset assembly comprising:

a planet pinion carrier;

5 long pinions having external gear teeth, mutually spaced angularly about an axis, and supported for rotation on the carrier; and

short pinions having external gear teeth and supported for rotation on the carrier, each short pinion being spaced about the axis, located between two long pinions and meshing with two long pinions.

10 2. The gearset assembly of claim 1, wherein the carrier further comprises a support including:

a disc disposed substantially perpendicular to, and aligned with the axis, having a first set of axially directed, angularly spaced holes, and a second set of axially directed, angularly spaced holes;

15 posts radially spaced from the axis, extending axially from the disc toward the pinions, each post mutually angularly spaced about the axis; and

a pad secured to each post, axially spaced from the disc, extending radially toward the axis, and having a axially directed hole aligned with a hole of the second set of holes.

20

3. The gearset assembly of claim 2, wherein the carrier further comprises a drum aligned with the axis, secured to the pads and the posts, and including a radially outer cylindrical surface.

25 4. The gearset assembly of claim 2, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and

a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad.

5           5.     The gearset assembly of claim 2, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and

a second group of pinion shafts fitted within a hole of the second set of holes  
10 for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad; and

a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly spaced holes, each hole of the third set being aligned with a hole of the first set, for  
15 supporting a pinion shaft of the first group on the backing plate.

6.     The gearset assembly of claim 2, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for  
20 rotation thereon;

a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, fitted within a hole on a pad, passing axially through a hole of a pad, and including a length portion that extends axially away from the pad; and

25           a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly spaced holes, each hole of the third set of holes being aligned with a hole of the first set of holes, for supporting a pinion shaft of the first group on the backing plate, and having a fourth set of axially directed, angularly spaced holes, each hole of the fourth

set being aligned with the length portion of a pinion shaft of the second group of pinion shafts.

7. The gearset assembly of claim 2, wherein the carrier further comprises a drum aligned with the axis, secured to the posts, and including a radially outer cylindrical surface; and

the drum and support are formed of powdered metal and are secured mutually by brazing.

8. A gearset assembly comprising:

a pinion carrier;

a first sun gear including external gear teeth;

a second sun gear including external gear teeth;

a ring gear including internal gear teeth;

a planet pinion carrier;

long pinions having external gear teeth, each pinion mutually spaced angularly about an axis, supported for rotation on the carrier, and in meshing engagement with the first sun gear and the ring gear; and

short pinions having external gear teeth and supported for rotation on the carrier, each short pinion being spaced about the axis, located between two long pinions and meshing with two long pinions.

9. The gearset assembly of claim 8, wherein the carrier further comprises a support including:

a disc disposed substantially perpendicular to, and aligned with the axis, having a first set of axially directed, angularly spaced holes, and a second set of axially directed, angularly spaced holes;

posts radially spaced from the axis, extending axially from the disc toward the pinions, each post mutually angularly spaced about the axis, the posts providing

angularly spaced openings between angularly adjacent posts, each opening sized to permit at least a portion of the gear teeth of the long pinions to engage the ring gear; and

a pad secured to each post, axially spaced from the disc, extending radially toward the axis, and having of two axially directed holes, aligned with a hole of the second set of holes.

10. The gearset assembly of claim 9, wherein the carrier further comprises a drum aligned with the axis, secured to the pads and the posts, and including a radially outer cylindrical surface.

11. The gearset assembly of claim 9, further comprising:  
a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and  
a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad.

12. The gearset assembly of claim 9, further comprising:  
a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and  
a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad.  
a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly

spaced holes, each hole of the third set being aligned with a hole of the first set, for supporting a pinion shaft of the first group on the backing plate.

13. The gearset assembly of claim 9, further comprising:

5 a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon;

a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion  
10 for rotation thereon, fitted within a hole on a pad, passing axially through a hole of a pad, and including a length portion that extends axially away from the pad; and

a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly spaced holes, each hole of the third set of holes being aligned with a hole of the first  
15 set of holes, for supporting a pinion shaft of the first group on the backing plate, and having a fourth set of axially directed, angularly spaced holes, each hole of the fourth set being aligned with the length portion of a pinion shaft of the second group of pinion shafts.

20 14. The gearset assembly of claim 9, wherein the carrier further comprises a drum aligned with the axis, secured to the posts, and including a radially outer cylindrical surface; and

the drum and support are formed of powered metal and are secured mutually by brazing.

25

15. A gearset assembly comprising:

a pinion carrier including

a disc disposed substantially perpendicular to, and aligned with the axis, having a first set of axially directed, angularly spaced holes, and a second set of axially directed, angularly spaced holes;

posts radially spaced from the axis, extending axially from the disc toward the pinions, each post mutually spaced angularly about the axis; and

a pad secured to each post, axially spaced from the disc, extending radially toward the axis, and having of two axially directed holes, aligned with a hole of the second set, the pads providing axially directed access spaces, each access space being aligned with a hole of the first set of holes;

long pinions having external gear teeth, each pinion mutually spaced angularly about an axis, supported for rotation on the carrier, and located in an access space; and short pinions having external gear teeth and supported for rotation on the carrier, each short pinion being spaced about the axis, located between two long pinions and meshing with two long pinions.

15

16. The gearset assembly of claim 15, wherein the carrier further comprises a drum aligned with the axis, secured to the pads and the posts, and including a radially outer cylindrical surface.

20 17. The gearset assembly of claim 15, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and

a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad.

18. The gearset assembly of claim 15, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for rotation thereon; and

5 a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, and fitted within a hole on a pad;

a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly spaced holes, each hole of the third set being aligned with a hole of the first set, for  
10 supporting a pinion shaft of the first group on the backing plate.

19. The gearset assembly of claim 15, further comprising:

a first group of pinion shafts fitted within a hole of the first set of holes for support on the disc, each pinion shaft of the first group supporting a long pinion for  
15 rotation thereon;

a second group of pinion shafts fitted within a hole of the second set of holes for support on the disc, each pinion shaft of the second group supporting a short pinion for rotation thereon, fitted within a hole on a pad, passing axially through a hole of a pad, and including a length portion that extends axially away from the pad; and

20 a backing plate disposed substantially perpendicular to, and aligned with the axis, spaced axially from the disc, and having a third set of axially directed, angularly spaced holes, each hole of the third set of holes being aligned with a hole of the first set of holes, for supporting a pinion shaft of the first group on the backing plate, and having a fourth set of axially directed, angularly spaced holes, each hole of the fourth  
25 set being aligned with the length portion of a pinion shaft of the second group of pinion shafts.

20. The gearset assembly of claim 15, wherein the carrier further comprises a drum aligned with the axis, secured to the posts, and including a radially outer cylindrical surface; and

the drum and support are formed of powdered metal and are secured mutually by  
5 brazing.

21. A gearset assembly comprising:

a planet pinion carrier;

four long pinions mutually spaced angularly about an axis, and supported for  
10 rotation on the carrier; and

four short pinions supported for rotation on the carrier, each short pinion being spaced about the axis, located between two long pinions and meshing with two long pinions.

15 22. The gearset assembly of claim 21, further comprising  
a first sun gear in meshing engagement with the short pinions; and  
a second sun gear in meshing engagement with the long pinions.

20 23. The gearset assembly of claim 21, further comprising  
a ring gear in meshing engagement with the long pinions;  
a first sun gear in meshing engagement with the short pinions; and  
a second sun gear in meshing engagement with the long pinions.

24. A gearset assembly comprising:  
25 a planet pinion carrier;  
five long pinions mutually spaced angularly about an axis, and supported for rotation on the carrier; and



five short pinions supported for rotation on the carrier, each short pinion being spaced about the axis, located between two long pinions and meshing with two long pinions.

5        25.    The gearset assembly of claim 24, further comprising  
a first sun gear in meshing engagement with the short pinions; and  
a second sun gear in meshing engagement with the long pinions.

10       26.    The gearset assembly of claim 24, further comprising  
a ring gear in meshing engagement with the long pinions;  
a first sun gear in meshing engagement with the short pinions; and  
a second sun gear in meshing engagement with the long pinions.

15